

ASOS Acquisition Control Unit (ACU) Wind Diagnostic Software Version (V) 2.79W

Field Verification Test

Introduction and Purpose

As documented in the Observing Systems Branch's (OPS22) draft ASOS Ice Free Wind Problem Resolution Plan, an investigation into problems noted at ASOS sites with Vaisala Ice-Free Wind (IFW) sensors will begin in December 2007. For the investigation, diagnostic ACU software (Version 2.79W) will be installed at 12 operational ASOS sites to both mitigate problems associated with the IFW sensor and to archive diagnostic data for analysis. **V2.79W is not intended for national deployment and is not to be installed at sites other than those participating in this project.** Following the installation of V2.79W at each site, the Test and Evaluation Branch (OPS24) will conduct a two-week Field Verification Test (FVT). The purpose of the FVT is to verify no negative impact on field operations as a result of the installation of V2.79W.

IFW Problem Background

Implementation of the IFW sensor began in September 2005 and the sensors are now operational at more than 700 ASOS sites. Recently, several problems have been noted at sites where the IFW sensors are installed:

“Invalid peak wind” messages in the SYSLOG – Although these messages indicate rejection of an invalid peak wind, the cause of the invalid peak wind needs to be identified.

Sudden increases in the 5-second/3-second wind speeds, lasting up to six minutes, when wind is usually under 6 knots. Observers at field offices have confirmed that the increased speeds are unrepresentative.

Invalid IFW sensor data – Wind data are missing, unreasonable, or corrupted.

The possible causes are:

Sensor firmware may be causing incorrect reporting of wind data to the Data Collection Platform (DCP) and the ACU.

ACU software may be corrupting or improperly overwriting wind data.

DCP - ACU communications may be losing or corrupting data.

Birds/insects/etc. at the IFW sensor may be affecting its operation.

## Diagnostic Software Description

The V2.79W (10/29/07) diagnostic software is designed to both mitigate problems associated with the IFW sensor and to archive diagnostic data in the ACU for analysis.

To mitigate IFW-related problems, fixes for some known software errors have been incorporated into the V2.79W software to:

Reduce the number of unreasonable wind speed occurrences by eliminating a visibility sensor checksum error which was found to cause overwriting of IFW data in the ACU memory.

Perform 5-second/3-second wind speed quality control (presence of wind data, range check, corrupted values) – rejecting the entire suite of 5-second/3-second wind data if it is suspect.

Reduce the number of “Serial Input/Output (SIO) Transmission Error” messages in the SYSLOG. Although the SIO errors do not impact observations, the SYSLOG messages are a nuisance.

With V2.79W installed, the ACU will archive diagnostic data (5-second wind data, “WT” commands, and wind speed quality control data) for download via the Direct Command Mode (DCM) and subsequent analysis.

Several additional tools will be used to aid in mitigating and diagnosing the IFW problems:

Federal Aviation Administration (FAA) bird abatement hardware will be installed at six sites.

The National Weather Service (NWS) bird perch will be installed at six sites.

A datalogger (to capture communications between the IFW sensor and the DCP) and video camera (to capture images of birds, etc.) will be installed at four sites.

## Participating Sites

V2.79W software and the additional tools (as noted below) will be installed at 12 operational ASOS field sites with a history of IFW problems:

Site	FAA Bird Abatement	NWS Bird Perch	Data Logger and Video Camera
Atlantic City (KACY), NJ		X	
Cleveland (KCLE), OH	X		
Detroit (KDTW), MI	X		
Pueblo (KPUB), CO		X	
Louisville (KSDF), KY	X		
Springfield (KSPI), IL		X	X
Baton Rouge (KBTR), LA		X	X
Fort Stockton (KFST), TX	X		
Melbourne (KMLB), FL	X		X
The Dalles (KDLS), OR		X	
Maryville (KMYV), CA	X		X
Santa Rosa (KSTS), CA		X	

Specific site characteristics and interfaces are listed in Table 1 on the last page.

## Field Verification Test Methodology

To verify no negative impact on field operations, a two-week FVT will be conducted at each site following the installation of V2.79W, during which ASOS performance will be monitored by OPS24 and by a designated Site Focal Point:

<u>Site</u>	<u>Site Focal Point</u>	<u>Phone Number</u>
Atlantic City (KACY), NJ	Keith Pugh (ESA at PHI)	609-261-6602
Cleveland (KCLE), OH	Paul Svoboda (ESA at CLE)	216-265-2382
Detroit (KDTW), MI	John Leibold (ESA at DTX)	248-625-3309 x 372
Pueblo (KPUB), CO	Chris Price (ESA at PUB)	719-948-9429
Louisville (KSDF), KY	Bill Whitlock (ESA at LMK)	502-968-6329
Springfield (KSPI), IL	Ed Martin (ESA at ILX)	217-732-4029 x 372
Baton Rouge (KBTR), LA	Gary Vaughan (ET at LIX)	985-645-0899
Fort Stockton (KFST), TX	Susan Griffin (ET at MAF)	432-563-5901
Melbourne (KMLB), FL	Dave Jacobs (ET at MLB)	321-255-0212
The Dalles (KDLS), OR	Bill Flieder (ESA at PQR)	503-326-2340 x 260
Maryville (KMYV), CA	Doug Swann (ESA at STO)	916-979-3051
Santa Rosa (KSTS), CA	Doug Swann (ESA at STO)	916-979-3051

## Installation

The V2.79W ACU software will be installed by field Electronics Technicians (ETs). Software CDs will be provided to the ETs no later than November 27 (the last day of the FAA's Thanksgiving moratorium) for installation beginning on November 28. It is important that V2.79W be installed at these 12 sites prior to the start of the Christmas/New Years moratorium (December 14).

### **V2.79W is not to be installed at any field sites other than those listed in this plan.**

The dataloggers and video cameras have already been installed by Sterling Research and Development Center (SRDC) staff. The bird abatement/bird perch equipment will be installed by NWS field staff at the direction of OPS22.

## Site Focal Point Responsibilities

If there is an on-site FAA presence, the Site Focal Point will contact the FAA prior to installation of V2.79W and request reporting of any problems noted by the FAA during the test.

When V2.79W is installed, the Site Focal Point will report the initiation of the FVT to the Test Director:

Jerald Dinges  
Test and Evaluation Branch (OPS24)  
301-713-0326 x160  
[gerald.dinges@noaa.gov](mailto:gerald.dinges@noaa.gov)

Throughout the FVT, the Site Focal Point will monitor ASOS performance, immediately reporting any problems to the Test Director. At the end of the two-week test period, the Site Focal Point will report results to the Test Director by e-mail.

At any time during the test, if the Site Focal Point (or the FAA) judges ASOS performance to be unacceptable, he/she is authorized to have the Electronics Technician re-install the previous software version to ensure continued satisfactory support of NWS and FAA operations. If V2.79W is removed at a site, the Test Director is to be informed immediately.

## Test and Evaluation Branch (OPS24) Responsibilities

OPS24 staff will monitor site performance and perform a site-by-site comparison of SYSLOG messages to a baseline archived prior to installation of V2.79W.

## Test Conclusion

At the end of the FVT two-week evaluation, if no critical problems are found, each test site will be approved for continued operation with V2.79W for OPS22's ASOS Ice Free Wind Problem Resolution project.

### Data Downloads and Analysis for the ASOS Ice Free Wind Problem Resolution Project

When advised of an IFW problem by the ASOS Operations and Monitoring Center, Science Applications International Corporation (SAIC) contract staff at the SRDC will download and analyze data from the dataloggers. In addition, OPS24 will download all ACU diagnostic data from the V2.79W sites and make it available for analysis by SAIC-Sterling.

It is anticipated that the collection and analysis of diagnostic data will continue through the summer 2008 to ensure experience with four seasons.

**Table 1 - ASOS V2.79W Field Verification Test Site Characteristics and Interfaces**

SID	Name	FAA Service Level	Staffing	DCPs	Multiple Sensors	Comms	ZR	TSTM/ALDARS	GTA/ATIS	ACE	RVR	WSP	AWPAG	Current Software Version
KACY	Atlantic City, NJ	C	PT	1	---	DIAL	ZR	---	ATIS	ACE	---	WSP	AWPAG	2.79D
KCLE	Cleveland, OH	A	FT	2	M/B	H/W	ZR	---	ATIS	---	---	---	AWPAG	2.79C
KDTW	Detroit, MI	A	FT	3	B	ADAS	ZR	ALDARS	ATIS	---	RVR	---	AWPAG	2.79D
KPUB	Pueblo, CO	D	PT	1	---	ADAS	ZR	ALDARS	ATIS	---	---	---	AWPAG	2.79D
KSDF	Louisville, KY	A	FT	1	---	H/W	ZR	---	ATIS	---	RVR	---	AWPAG	2.79D
KSPI	Springfield, IL	C	PT	1	B	ADAS	ZR	ALDARS	ATIS	---	---	---	AWPAG	2.79D
KBTR	Baton Rouge, LA	B	FT	1	---	DIAL	--	---	ATIS	---	RVR	---	AWPAG	2.79D
KFST	Fort Stockton, TX	D	---	1	---	ADAS	---	ALDARS	GTA	---	---	---	---	2.79D
KMLB	Melbourne, FL	C	PT	1	---	ADAS	---	ALDARS	ATIS	---	---	---	---	2.79D
KDLS	The Dalles, OR	D	---	1	---	ADAS	ZR	ALDARS	GTA	---	---	---	---	2.79D
KMYV	Maryville, CA	D	---	1	---	ADAS	---	ALDARS	GTA	---	---	---	---	2.79D
KSTS	Santa Rosa, CA	C	PT	1	---	ADAS	---	ALDARS	ATIS	ACE	---	---	---	2.79C